

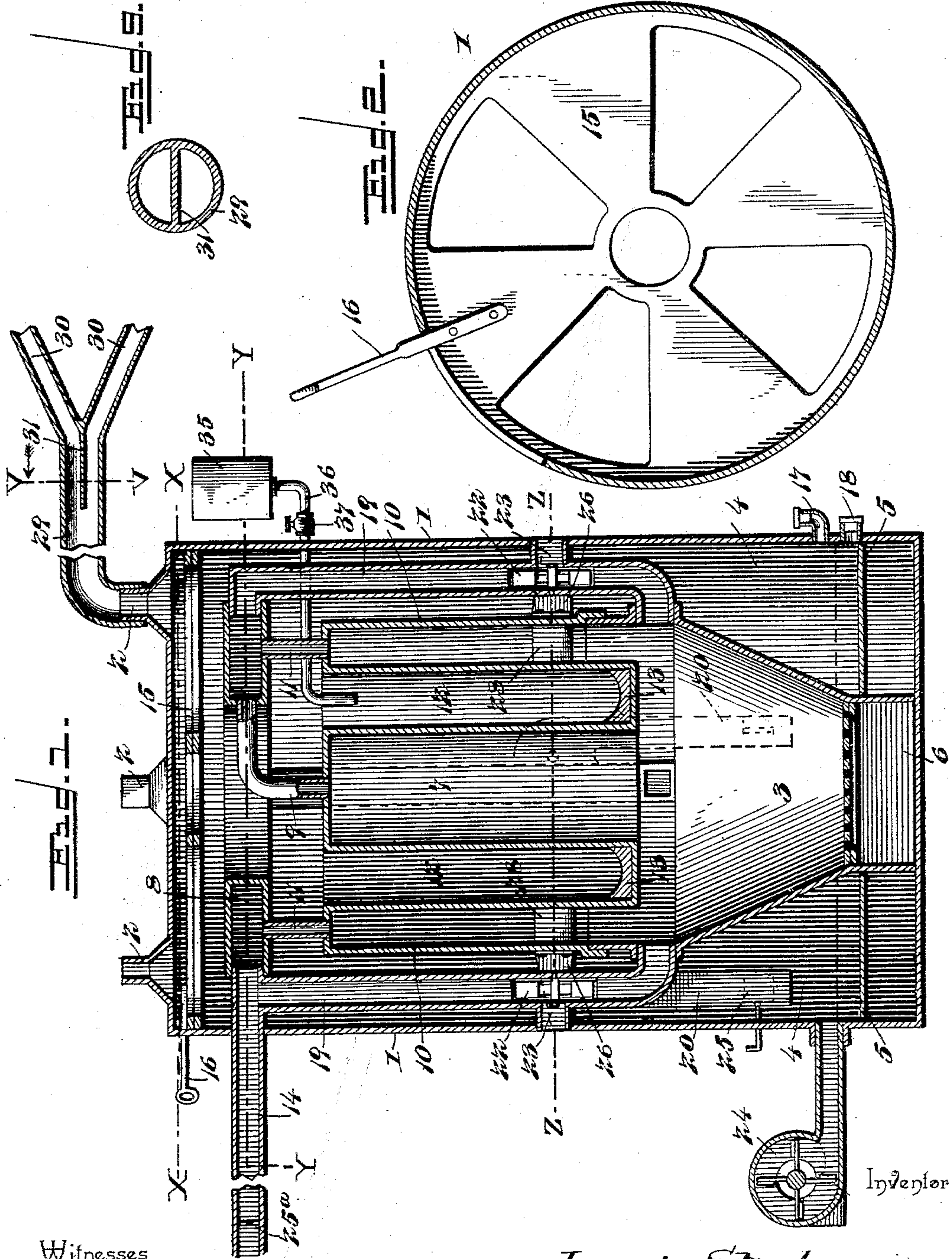
(No Model.)

2 Sheets—Sheet 1.

L. STEELMAN.
HOT AIR FURNACE.

No. 597,091.

Patented Jan. 11, 1898.



Witnesses
E. Stewart.
V. B. Hillyard.

By *Lewis Steelman*
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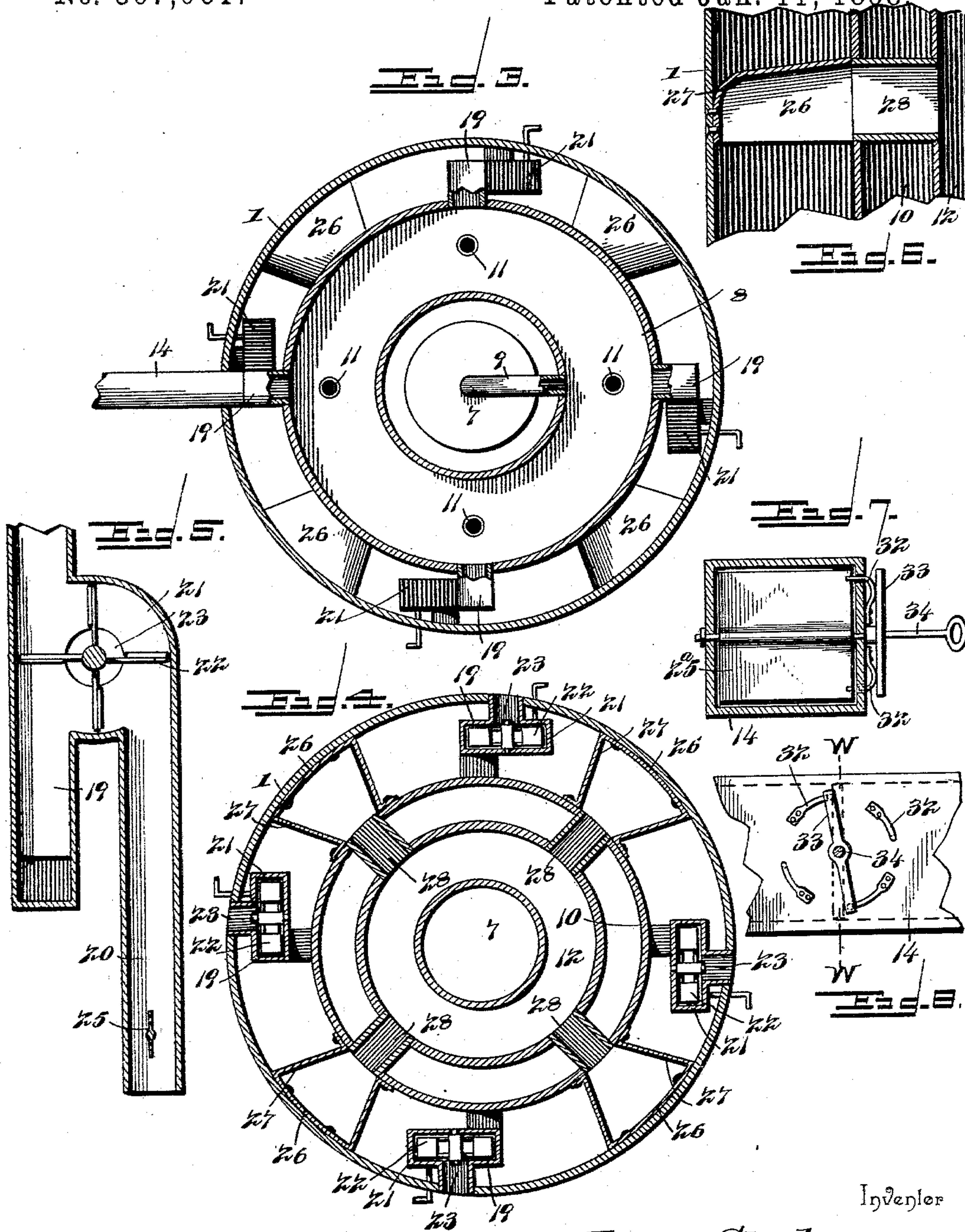
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Inventor

Lewis Steelman

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Chas. Snow Geo.

UNITED STATES PATENT OFFICE.

LEWIS STEELMAN, OF SALEM, NEW JERSEY, ASSIGNOR OF ONE-HALF TO
JOHN P. SHEPPARD, OF SAME PLACE.

HOT-AIR FURNACE.

SPECIFICATION forming part of Letters Patent No. 597,091, dated January 11, 1898.

Application filed November 23, 1896. Serial No. 613,215. (No model.)

To all whom it may concern:

Be it known that I, LEWIS STEELMAN, a citizen of the United States, residing at Salem, in the county of Salem and State of New Jersey, have invented a new and useful Hot-Air Furnace, of which the following is a specification.

This invention aims to provide a hot-air furnace for heating air to be conveyed to points remote from the furnace for warming apartments or places in which it is not desirable to locate a stove or other form of heater, and has for its objects to secure a positive circulation of air through the furnace, to secure a maximum amount of heating-surface, to provide for moistening or medicating the air to meet certain requirements, to insure a correct positioning of the draft-controlling dampers, and to utilize the natural currents for creating a forced current through the furnace, all as will appear more fully hereinafter.

For a full understanding of the merits and advantages of the invention reference is to be had to the accompanying drawings and the following description.

The improvement is susceptible of various changes in the form, proportion, and the minor details of construction without departing from the principle or sacrificing any of the advantages thereof, and to a full disclosure of the invention an adaptation thereof is shown in the accompanying drawings, in which—

Figure 1 is a vertical central section of a hot-air furnace embodying the vital features of this invention. Fig. 2 is a plan section on the line X X of Fig. 1. Fig. 3 is a plan section on the line Y Y of Fig. 1. Fig. 4 is a horizontal section on the line Z Z of Fig. 1. Fig. 5 is a detail view in elevation of a combined smoke and air inlet pipe. Fig. 6 is a detail view of the collector for catching and directing a portion of the ascending current into the annular space formed between the inner and outer smoke-drums. Fig. 7 is a section on the line W W of Fig. 8, showing a damper and the means for operating and holding it in an adjusted position. Fig. 8 is a front view of the parts illustrated in Fig.

7. Fig. 9 is a section on the line V V of Fig. 1, looking in the direction of the arrow.

Corresponding and like parts are referred to in the following description and indicated in the several views of the accompanying drawings by the same reference-characters.

The numeral 1 designates the casing, which incloses the vital parts of the furnace and to the upper portion of which are provided a series of thimbles or collars 2 for attachment therewith of the pipes for conveying the heated air to the required point of use. The fire-pot 3, which may be of ordinary construction, has a surrounding space 4, which is subdivided by a horizontal diaphragm 5 into upper and lower spaces, the latter being a dead-air space to prevent the loss of heat by radiation and surrounding the ash-pit 6. A smoke-drum 7 is located centrally over the fire-pot and is closed at its upper end and sides and open at its lower end and has connection with a smoke-ring 8 at its top by means of a pipe 9. An annular or cylindrical smoke-drum 10 surrounds the smoke-drum 7 and is closed at its sides and top and opens at its lower end into the fire-pot and has connection at its top with the smoke-ring 8 by means of short vertical pipes 11. An annular space 12 is formed between the inner and outer smoke-drums and is closed at its lower end and open at its top end and is provided at its lower end with a ring or bed 13, of porcelain, earthenware, or other refractory material, which is hollow or concave in its top side to form a trough to receive a suitable liquid which is vaporized and medicates or renders the air humid for any purpose required. The smoke, gases, and products of combustion escape from the fire-pot into the drums 7 and 10 and pass therefrom to the smoke-ring by the pipes 9 and 11, and pass thence to a stack or chimney by means of a smoke-pipe 14 in the usual manner.

A damper 15 is located in the upper portion of the casing 1 to control the hot air in its passage to the thimbles or collars 2 and consists of similar plates having corresponding openings, one of the plates being movable and provided with an operating-handle 16, by

means of which it can be turned so as to regulate the size of the openings or completely shut off the hot air from the thimbles 2 and the pipes connected therewith. The lower portion of the hot-air space 4 receives a supply of water for moistening the air prior to its being heated and conveyed to the point of use, said water being supplied thereto through a tube 17 at one side of the casing and, when required, any water remaining can be drawn off by means of the drain-pipe 18, the tube 17 and the pipe 18 being closed by caps or stoppers when the furnace is in operation and when desired.

A series of smoke-pipes 19 communicate at their upper ends with the smoke-ring 8 and at their lower ends with the upper portion of the fire-pot 3, and an air-pipe 20 connects with each a short distance from the fire-pot. A fan-case 21 is provided at the juncture of the air and smoke pipes 20 and 19 and is supplied with a fan 22 of ordinary construction, the latter being disposed so that a wing projects across the smoke-pipe 19 and a wing at a diametrically opposite point extends across the air-pipe, which is of advantage to insure a rotation of the fan by the ascending current of hot air or products of combustion from the fire-pot, and as the fan rotates it draws in a supply of air through a thimble or opening 23 and forces a portion thereof down through the air-pipe 20 and into the air-space 4. While the horizontal wings of a fan extend across the smoke and air pipes 19 and 20, respectively, the vertical wings separate the two pipes and prevent the smoke and gases from being drawn or escaping into the air-pipe 20. This disposition of the wings with respect to the pipes 19 and 20 is clearly indicated in Fig. 5. Obviously some of the fresh air entering through the opening 23 will escape through the pipe 19 along with the smoke, gases, and hot air, but a sufficient quantity will be forced through the pipe 20 into the space 4 for all practical purposes. For factories or heating large places air may be forced into the air-space 4 by means of a fan-blower 24, and in order to prevent any back draft through the pipes 20 the latter will be supplied with dampers 25, which are closed when the fan-blower 24 is in operation, but which are open when the fan 24 is not in operation.

A collector 26 is located in the space formed between the casing 1 and outer wall or shell of the drum 10, and consists of a hood 27 and a short length of pipe 28, the latter extending through the walls or shells comprising the smoke-drum 10 and connecting the annular space 12 with the space exterior to the drum 10, thereby creating a circulation through the said space 12. These collectors 26 will be provided in any required number according to the size and capacity of the furnace and will be disposed at proper intervals around the smoke-drum 10. The hoods 27 intercept a portion of the ascending current of air and

deflect the same through the pipes 28 into the space 12, and this deflected air is heated by radiation from the opposing walls of the drums 7 and 10 and rising passes to the required point of use in the ordinary manner.

A hot-air pipe 29 may be supplied with branches 30, the latter extending to different points, and in order to insure a division of the hot air passing through the pipe 29 the latter is separated by a longitudinal partition 31, the branch pipes 30 communicating with the spaces upon opposite sides of the partition 31, as clearly indicated in Fig. 1.

A damper 25^a is located in the smoke-pipe 14 and is held in either an open or closed position by spring-stops 32, which are located exterior to the pipe and are secured to the latter at one end and have their free end bent and operating loosely through openings in the side of the pipe to which the spring-stops are attached. These spring-stops are provided in pairs and are located at diametrically opposite points, so as to engage with opposite sides of the damper and hold the latter in either position. Under normal conditions the active or bent ends of the spring-stops are withdrawn from the path of the damper and are pressed inward by a cross-bar 33, secured to the stem 34, provided for operating the damper. The parts are so disposed that prior to the damper reaching an open or a closed position the bar 33 will engage with the spring-stops 32 and depress the latter so as to project their active ends across the path of the damper, thereby limiting the movement of the latter when it reaches the proper position.

A tank 35 is located exterior to the furnace, and a pipe 36 leads therefrom into the annular space 12 and is provided in its length with a regulating-valve 37 for controlling the passage of the fluid from the tank through the pipe into the space 12. If it be required to render the air humid simply, the fluid is water; but if it be required to medicate the air any suitable solution may be placed in the tank, and the valve 37 being regulated the solution will escape in a proper quantity into the space onto the bed 13 and being vaporized by the heat will commingle with the hot air and be conveyed to the required point, as will be readily understood.

Having thus described the invention, what is claimed as new is—

1. In a hot-air furnace, the combination of the casing and fire-pot arranged to form an air-space between them, a horizontal diaphragm subdividing the air-space, the lower being a dead-air-space surrounding the ash-pit, means for supplying a fluid to the lower portion of the upper air-space, and a fan for projecting a current of air into the said upper air-space to be heated and take up a proportion of the fluid in the form of vapor, substantially as set forth.

2. In a hot-air furnace, the combination of a smoke-ring, inner and outer drums disposed to form a space between them and having in-

dependent connection with the said smoke-ring, an annular bed of refractory material in the lower portion of the space between the aforesaid drums and made hollow or concave in its top side, and a valve-controlled pipe for supplying a fluid to the concave side of the said bed, whereby the said fluid is vaporized, substantially as and for the purpose specified.

3. In a hot-air furnace having a hot-air space surrounding the fire-pot, the combination of a smoke-pipe communicating with the fire-pot, an air-pipe extending into the said hot-air space, and a fan at the juncture of the air-pipe with the smoke-pipe for drawing in a supply of fresh air and forcing it into the aforesaid hot-air space, substantially in the manner and for the purpose set forth.

4. In a hot-air furnace having an air-space surrounding the fire-pot, the combination of a smoke-pipe communicating with the fire-pot, an air-pipe in communication with the smoke-pipe and extending into the aforesaid air-space, and a fan located at the juncture of the air-pipe with the smoke-pipe and operated automatically by the ascending current of smoke, gases or hot air and forcing a supply of fresh air into the said air-space, substantially as set forth.

5. In a hot-air furnace, the combination of a pipe, a damper located therein, spring-actuated stops placed at diametrically opposite points and adapted to operate at right angles to the line of motion of the damper and normally held out of its path, and a bar attached to and rotatable with the damper-operating stem and adapted to engage with and press upon the stops and project them across the path of the damper to limit its movement, substantially as set forth.

6. In a hot-air furnace, the combination of

inner and outer drums inclosing a hot-air space between them, and a collector consisting of a hood projecting across the space exterior to the outer drum, and a pipe extending across the space between the walls of the outer drum and communicating with the space formed between the inner and outer drums, substantially as and for the purpose set forth.

7. In a hot-air furnace, the combination of a casing, a fire-pot, inner and outer drums located above the fire-pot and inclosing a space which is closed at its lower end, and a series of collectors located in the space formed between the outer drum and casing and extending through the outer drum and communicating with the space formed between the two drums, substantially as and for the purpose set forth.

8. In a hot-air furnace, the combination of inner and outer smoke-drums inclosing a space between them, a smoke-ring in communication with each of the said drums, smoke-pipes between the fire-pot and smoke-ring, air-pipes in communication with the smoke-pipes and extending into the hot-air space surrounding the fire-pot, and fans located at the juncture of the said air-pipes with the smoke-pipes and automatically actuated by the ascending current of smoke, gases or hot air to draw in a supply of air and force the same into the space exterior to the fire-pot, substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

LEWIS STEELMAN.

Witnesses:

JOHN H. SIGGERS,
WM. B. HUDSON.